

SEG SRW 2011

summer research workshop

INVERTING THE RESERVOIR

Auberge Saint Antoine,
Quebec City, Canada
26–30 JUNE 2011



IQ Earth



nexen



Sunday, 26 June

12–1 PM CE Course Registration
1–4:30 PM Continuing Education Course, **Full Waveform Inversion**—*Mrinal Sen (UT-Austin)*
3:30–5 PM Workshop Registration
6–8 PM **Icebreaker/Welcome Reception**

Monday, 27 June

Morning Sessions

Session Chairs—Case Histories—*Paul Williamson, Adriana Ramirez*

8:30 **Introduction**
8:40–9:10 **Exploring the Value of New Technology Developments for Inverting the Reservoir**—*Kenneth Tubman (ConocoPhillips)* **Keynote**
9:10–9:35 **Prediction of Sub-Seismic Resolution Stratigraphic Changes Using Waveform and Seismic Attribute Analysis: Case Study from Alberta Oil Sands**—*Andrew Barrett (Statoil Canada Ltd)*
9:35–10 **Rock Physics Modelling and Seismic Inversion for Fluid and Lithology Detection: An Onshore Niger Delta Example**—*Emobi Chigozie Ekwe (U of Nigeria)*
10–10:25 **Delineating Thin Reservoir Compartment Using Integrated Energy Spectra (INTENS)—Constrained Seismic Inversion**—*Eko Widi Purnomo (U Teknologi Petronas)*
10:25–10:45 *Coffee Break*

Session Chairs—Full Waveform Inversion (1)—*Adriana Ramirez, Paul Williamson*

10:45–11:15 **Inverting the Reservoir—Challenges to the Full Waveform Inversion**—*Subhashis Mallick (U of Wyoming)* **Keynote**
11:15–11:40 **Elastic Full-waveform Inversion as a Tool for Reservoir Characterization**—*James Rickett (Schlumberger Cambridge Research)*
11:40–12:05 **Full-waveform Based Complete Moment Tensor Inversion and Stress Estimation from Downhole Microseismic Data for Hydrofracture Monitoring**—*Fuxian Song (Massachusetts Inst of Technology)*
12:05–12:35 *General Discussion*
12:35–1:30 *Group Lunch*

Afternoon sessions

Session Chairs—Full Waveform Inversion (2)—*Subhashis Mallick, James Rickett*
1:30–1:55 **Reservoir Oriented Full Waveform Inversion**—*Dries Gisolff (Delft U of Technology)*
1:55–2:20 **The Role of Full-waveform Inversion in the Construction of Models for Reservoir Properties**—*Steve Kelly (Petroleum Geo-Services)*
2:20–2:45 **Pre-Stack Seismic Inversion Methods Used in the Prediction of Gas Hydrates, Deepwater GOM**—*George Bunge (Data & Consulting Services/Schlumberger Ltd)*
2:45–3:15 *Coffee Break*

Poster Session

3:15–5 **Full Waveform Inversion, Time-Lapse Inversion Multi-Resolution Analysis of Seismic Data Using Continuous Wavelet Transforms: A Case Study of “X” Field Niger Delta Nigeria**—*Oladimeji Muibi (Obafemi Awolowo U)*

Inversion of Seismic Attributes for Petrophysical Parameters and Rock Facies—*Mohammad Shahraeeni (U of Edinburgh)*
Anisotropic Elastic Moduli: Integration of Seismic with Borehole Wireline and Other Measurements—*Niranjana Banik (Schlumberger-WesternGeco)*
4D Joint Pre-stack Seismic Stratigraphic Inversion of the CO₂ Storage Reservoir (Utsira Sand Formation) at Sleipner Site—*Nicolas Delepine (IFP Energies Nouvelles)*
Full Bandwidth 2-D Full-waveform Inversion by Domain Decomposition—*Peter Haffinger (Delft U of Technology)*
4D AVO Modelling for Lithology and Fluid Prediction in the Malay Basin—*Salbiah Bt Isa (Petronas Research Sdn. Bhd)*
Uncertainty of 4D AVO Modeling in Weyburn CO₂ Sequestration—*Jinfeng Ma (Northwest U)*
Mapping of Fractured Basement Reservoir Using Seismic Inversion and 3-D Visualization —A Case Study from Western Offshore Basin of India—*S. K. Pokhriyal (Oil and Natural Gas Corp)*
Velocity Refinement by Full Waveform Inversion for Reservoir Positioning—*Denes Vigh (WesternGeco)*

5–5:30 *General Discussions/ Wrap-up*

Tuesday, 28 June

Morning Sessions

Session Chairs—Inversion of Time-Lapse Seismic Data—*Robert Stewart, Christian Hubans*
8:30–9 **4D Seismic Inversion**—*Harald Flesche (Statoil)* **Keynote**
9–9:25 **Time-lapse Seismic Tomography Using an Active Time Constraint (ATC) Approach**—*Marios Karaoulis (Colorado School of Mines)*
9:25–9:50 **Joint AVO Inversion for Time-lapse Elastic Reservoir Properties: Hangingstone Heavy Oilfield, Alberta**—*Ayato Kato (JOGMEC)*
9:50–10:15 **CAL4D : A New Approach for Quantitative 4D Interpretation**—*Christian Hubans (Total)*
10:15–10:45 *Coffee Break*

Session Chairs—Inversion of Time-Lapse Seismic Data (2),—
Robert Stewart, Christian Hubans

10:45–11:10 **Wave-equation Inversion of Time-lapse Seismic Data Sets**—*Gboyega Ayeni (Stanford U)*
11:10–11:35 **Time-lapse Prestack Elastic Impedance Inversion Based on Seismic Difference Data**—*Zhu Zhenyu (CNOOC Research Inst)*
11:35–12 **Towards Engineering-Consistent 4D Inversion**—*Sean Tian (Heriot-Watt U)*
12–12:30 *General Discussions*

Afternoon Session

NO TECHNICAL PROGRAM
Lunch/Dinner On Own

Wednesday, 29 June

Morning Sessions

Session Chair—Stochastic and Geostatistical Inversion
Rongrong Lu
8:30–9 **The Role of Importance Sampling In Geophysical Inversion**—*Paul Stoffa (UT-Austin)* **Keynote**
9–9:25 **Stochastic Bayesian Algorithm to Estimate Large Scale Gas Hydrate Grade at the Mallik Field, Mackenzie Delta, Canada, Camille Dubreuil-Boisclair (INRS-ETE)**
9:25–9:50 **Inverting for Lithology: A Stochastic Inversion Case from Enfield, Exmouth Sub-basin, Australia**—*F. Hasan Sidi (Woodside Energy Ltd)*
9:50–10:15 **Comparing Lithoseismic Classifications from Deterministic and Geostatistical Seismic Inversions**—*Thierry Cadoret (Total EP)*
10:15–10:45 *Coffee Break*

Session Chair—Stochastic and Geostatistical Inversion (2)—
Rongrong Lu

10:45–11:10 **Geostatistical Deterministic Elastic Inversion**—*Adam Cherrett (Maersk Oil)*
11:10–11:35 **Seismic Inversion to Lithologic Facies Using Multiple-point Geostatistics and Its Application to the Athabasca Oil Sands**—*Koji Kashihara (Japan Petroleum Exploration)*
11:35–12 **Single Loop Inversion of Facies from Seismic Data Based on Sequential Simulations and Probability Perturbation Method**—*Dario Grana (Stanford U)*
12–12:30 *General Discussions*
12:30–1:30 *Group Lunch*

Afternoon Session

Session Chairs—Anisotropy—*Arthur Cheng, Adam Cherrett*
1:30–1:55 **Interval Anisotropy Estimation from Inversion of Walkaway VSP Data**—*Donghong Pei (Halliburton)*
1:55–2:20 **Azimuthal Elastic Inversion of Fractured Reservoirs**—*Benjamin Roure (CGGVeritas)*
2:20–2:45 **A Potential Useful Tool for Identifying ‘Sweet Spot’ of Shale Gas—Get Density Anomaly from S-Zero Stack**—*Keshan Zou (Schlumberger)*
2:45–3:15 *Coffee Break*

Poster Session

3:15–5 **Stochastic, Joint, Anisotropy Combining Borehole Logs and 2D Post-stack Seismic Profiles by Kriging with External Drift to Build a 3D Geological Model for CO₂ Storage in the Bécancour Area, Québec, Canada**—*Maxime Claproud (INRS-ETE)*
Stochastic Characterization of Multi-dimensional, Multi-variant, and Multi-scale Distribution of Heterogeneous Reservoir Rock Properties—*Jun-Wei Huang (U of Toronto)*
Joint Inversion Project for Improved Sub-salt and Sub-basalt Imaging—*Michael Jordan (SINTEF Petroleum Research)*
Prediction of Reservoir Properties Using Stochastic Seismic Inversion and Artificial Neural Networks—*Emilson Pereira Leite (U of Campinas)*
Hydraulic Flow Unit Classification for Geological Modeling of the Shaly-sandy Reservoir Using Core, Log and 2D Seismic Data, an Example of the Miocene Formation—*Ha Quang Man (AGH U of Science and Technology)*
Application of a Genetic Algorithm to Improve an Elastic Inversion in an Area with Poor Well Information—*Edward Moncayo (Petrobras)*

The Correction Method for the First Branch of the Apparent Resistivity Curve of Transient Electromagnetic Method—*Zhou Nannan (Chinese Academy of Sciences)*

A Study for Optimum Angle of Elastic Impedance in Malay Basin through Correlation with Poisson’s Ratio—*Salbiah Isa (Petronas Research Sdn. Bhd)*

Pre-injection Reservoir Evaluation at Dickman Field, Kansas: Stochastic Pre-stack Inversion and Flow Modeling—*Son Dang Thai Phan (UT-Austin)*

Inversion of Seismic Attributes for Petrophysical Parameters and Rock Facies—*Mohammad Shahraeeni (U of Edinburgh)*

A New MCMC Method for Joint Inversion of Land Multi-component Pre-stack Seismic Data—*Yang Xue (UT-Austin)*

5–5:30 *General Discussions/ Wrap-up*
7 *Group Dinner*

Thursday, 30 June

Morning Sessions

Session Chair—Advanced Techniques—Joint, Stochastic, Full Waveform and Beyond—*Ketil Hokstad, Michael Frenkel*
8:30–9 **Broadband Seismic—Good News for Reservoir Characterization?**—*Cyrille Reiser (Petroleum Geo-Services)* **Keynote**
9–9:25 **3D Reservoir Model and Resource Estimation for a North Sea Oil Field from Quantitative Seismic & CSEM Interpretation**—*Jan Petter Morten (EMGS)*
9:25–9:50 **Building Reservoir Models of Facies and Fluids by Integrating Geological and Geophysical Data in a Highly Detailed Stratigraphic Framework Using Geostatistical Inversion**—*John Pendrel (Fugro-Jason)*
9:50–10:15 **Using the Neighbourhood Algorithm for CSEM and Seismic Full Waveform Inversion of Reservoir Properties**—*Moritz Fliedner (Rock Solid Images)*
10:15–10:45 *Coffee Break*
10:45–11:10 **A Derivative-Free Approach for Reservoir Inversion**—*David Ciaurri (IBM)*
11:10–11:35 **Is Subsalt Post-Stack Inversion Possible?**—*Huyen Bui (WesternGeco)*
11:35–12 **Joint Transmission and Reflection Traveltime Tomography Using the Fast Sweeping Method and the Adjoint-state Technique**—*Jun-Wei Huang (U of Toronto)*
12–12:30 *General Discussions/ Wrap-up Lunch On Own*